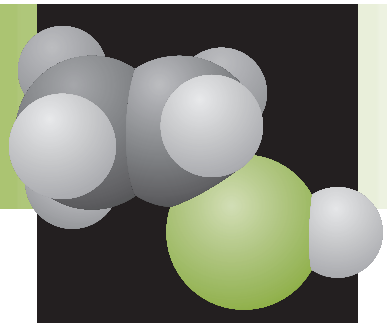
CHEMICALS
Project Fact Sheet



Advanced Electrodeionization Technology for Product Purification, Waste Recovery, and Water Recycling

Benefits

- Energy savings of 5.3 x 10^{12} Btu in 2020
- Reduction in waste water by 61.5 x 10^{6} tons per year
- Reduction in waste salt by 0.36 x 10^{6} tons per year
- Offers continuous operation
- Avoids the use of chemical regenerants
- Optimizes cost-effectiveness
- Handles feed streams too dilute for electrodialysis

Applications

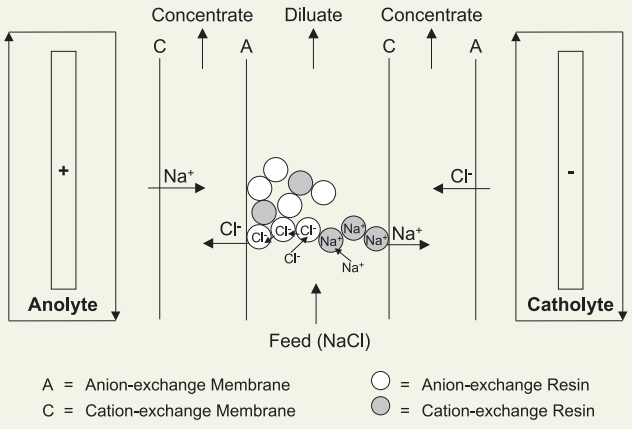
This technology is expected to help meet several major challenges in chemical manufacturing. Among the potential applications are its use in purifying chemical products, recovering waste, and recycling processing water.

Electrodeionization has the potential for numerous industrial applications

Electrodeionization, also called “electrochemical ion-exchange,” is an established technology that blends the features of ion-exchange (an adsorption technology) and electrodialysis (a membrane-separation technology). Advantages of electrodeionization over these single technologies include greater energy efficiency, elimination of chemical regenerants (acids and bases), and elimination of salty waste water streams. Electrodeionization can also handle very dilute feed streams of low electrical conductivity.

Until now, this technology has primarily been applied to purifying water for the pharmaceutical, semiconductor, and biotechnology sectors. This project would expand its application to the chemical industry for economically purifying products, recovering waste, and recycling water. The industry’s process streams and waters are highly complex, and electrodeionization has the potential to handle such challenges as organic foulants, multivalent ions, and an acidic or basic pH.

Electrodeionization Construction and Principle



Electrodeionization combines ion-exchange and electrodialysis to offer efficient and continuous operation.

Project Description

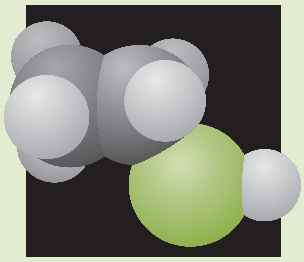
Goal: To develop electrodeionization technology for applications in chemical process industries that will result in minimized waste production and improved energy efficiency.

Argonne National Laboratory is conducting laboratory studies of electrodeionization technology and processes and providing technical support to NTEC EDSep, Inc., for system design and process scale-up. Experiments are conducted using both synthetic solutions and samples from industrial processing streams.

In year one of the two-year project, bench-scale testing of various anion- and cation-exchange resins is being performed to measure the conductivities in various ionic forms and potential for organic fouling. Various electrodeionization cell configurations will also be evaluated, and correlated with the resin experiments. Using samples from industrial streams, the feasibility of several potential applications will be studied, and a preliminary process design and economic evaluations will be prepared. In year two, two commercially promising processing applications will be chosen for longer-term laboratory studies of the electrodeionization system in order to refine the design and economic evaluations. Following accelerated tests of membranes and resins, one application will be chosen for pilot-scale testing.

Progress and Milestones

- The first two target process applications were selected for feasibility studies.
- Three more applications will be selected for feasibility studies in early 1999.
- All the feasibility studies will be completed in 1999, followed by selection of two target applications for laboratory-scale process development.
- One process application will be selected for pilot-scale development at a field site, to be funded by the industrial partner.



Project Partners

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